

Emerging Technology: Hot Surface Ignition of Directly Injected Natural Gas

NGV Technology Forum

Benefits:

- Diesel engine based
- High thermal efficiency
- High torque
- Low particulates/smoke

- Low CO₂ emissions

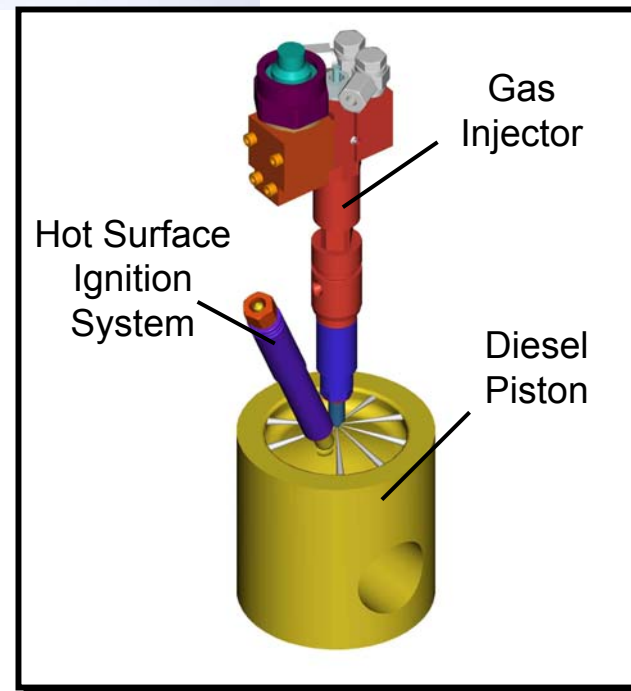
Challenges:

- Control and protection of glow plug for durability
- Control of combustion and THC at light load



Directly-Actuated Injector

Using dedicated high-pressure, common-rail, natural gas injectors





Emerging Technology: Micro Pilot[®] Ignition



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- MicroPilot[®] natural gas engine combines the advantage of low NOx emissions of a spark-ignited, lean-burn natural engine, with the high efficiency and power density of a diesel engine
- MicroPilot[®] engine is a dedicated natural gas engine with a MicroPilot[®] diesel injector used for ignition rather than a spark plug (around 1% diesel, 99% natural gas)
- Retaining the time-proven direct diesel injection technology as the ignition source changes how the engine burns fuel, from a typical spark-ignition process to compression-ignition
 - Provides reliable and much higher energy, power and ignition intensity and evenly distributed ignition sources over the space of combustion chamber, as compared to a single ignition source from spark plug)
 - The high burn rate for pilot fuel droplets provides a higher burn rate for the 99% homogenous gas and air charge as compared to spark gas
- It is the increased ignition intensity that permits extension of lean combustion limit, accompanying drop in peak temperature (lower NOx emissions)
- Lube oil could potentially be used as pilot fuel replacing diesel, eliminating oil change/disposal, and diesel fuel tank
- Clean Air Partners has demonstrated the MicroPilot[®] technology on Caterpillar 3406 since 1997 (MicroPilot[®] is a registered trademark of Clean Air Partners)